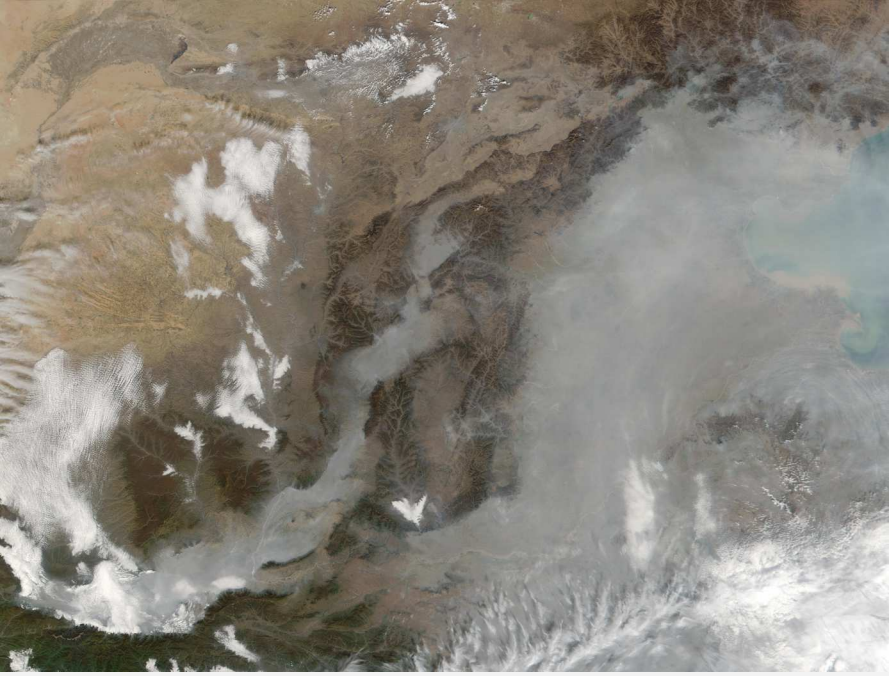

National Aeronautics and
Space Administration

Sensors

Optical Path Switching Based Differential Absorption Radiometry

For substance detection

NASA Langley Research Center has developed a strong capability in the field of open beam gas filter correlation radiometry (GFCR) and gas filter differential absorption radiometry (DAR). Langley invented numerous techniques and prototypes for using GFCR and DAR to perform a variety of measurements including auto emissions monitoring, methane leak detection, and pollution monitoring. From that work, Langley has developed an optical path switch system and method for detecting one or more substances.

BENEFITS

- Multiple substances can be detected simultaneously
- Substance detection and measurement can be achieved without using gas cells

technology solution

THE TECHNOLOGY

The optical path switch receives radiation passing along a measurement or sample path of interest and divides it into a time series of alternating first and second polarized components.The first polarized components are transmitted along a first optical path and the second polarized components along a second optical path. A first gasless optical filter train disposed in the first optical path filters the first polarized components to isolate at least a first wavelength band thereby generating first filtered radiation. A second optical filter train disposed in the second optical path filters the second polarized components to isolate at least a second wavelength band thereby generating second filtered radiation. The first wavelength band and second wavelength band are unique. Further, spectral absorption of a substance of interest is different at the first wavelength band as compared to the second wavelength band. A beam combiner disposed to receive the first and second filtered radiation combines same to form a combined beam of radiation. A detector is disposed to monitor magnitude of at least a portion of the combined beam alternately at the first wavelength band and the second wavelength band as an indication of the concentration of the substance in the sample path.

The technology could be used for monitoring air pollution.

APPLICATIONS

The technology has several potential applications:

- Aircraft emissions monitoring
- Cabin air quality monitoring
- Pollution monitoring via remote sensing
- Automotive emissions monitoring
- Methane leak detection

PUBLICATIONS

Patent No: 6,922,242

More Information

National Aeronautics and Space Administration

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